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12.7

Shutdown or Transfer of Facilities, Operations or Associated Equipment

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Recommended for approval by the ES&H Working Group

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New document or new requirements

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* Minor revision

Terms and Definitions

Deactivation	The process of placing a facility in a stable and known condition—including the removal of hazardous and radioactive materials to ensure adequate protection of the worker, public health and safety, and the environment—thereby limiting the long-term cost of surveillance and maintenance. Actions include the removal of fuel, draining and/or de-energizing nonessential systems, removal of stored radioactive and hazardous material, and related actions. Deactivation does not include all decontamination necessary for the dismantlement and demolition phase of decommissioning, e.g., removal of contamination remaining in the fixed structures and equipment after deactivation.
Decontamination	Removal of process or construction contamination from facilities, equipment, or soils by washing, heating, chemical or electrochemical action, mechanical cleaning, or other techniques.
Disposition	The act or power of disposing or making final arrangements, or, for purposes of this document, the process of deciding what to do with the facility. Possible outcomes might be demolition, reuse, or transfer.
Disposition	Those operations that follow completion of program mission, including, but not limited to, surveillance and maintenance, deactivation, and decommissioning.
Process contamination	A facility (and equipment) that has been contaminated by the processes conducted therein. This includes radioactive, chemical, explosive, and/or biological contamination. This term is limited to materials and quantities declared to be hazardous by federal, state, and DOE regulations. It does not include materials used in the construction of the facility or background constituents that are indigenous.

Surveillance and maintenance

These operations are conducted throughout the life cycle of the facility, even when a facility is not operating and is not expected to operate again, and they continue until they are phased out during decommissioning. Operations include providing, in a cost-effective manner, periodic inspections and maintenance of structures, systems, and equipment necessary for the satisfactory containment of contamination and protection of workers, the public, and the environment.

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Shutdown or Transfer of Facilities, Operations or Associated Equipment

1.0 Introduction

Laboratory policy requires facilities and equipment contaminated with radioactive or other hazardous materials to be managed safely at all times to ensure the protection of employees and the public. Any process contaminated facility or major operation (e.g. portion of facility, room, glovebox line) that will be shut down on a temporary or extended basis requires a Shutdown, Surveillance, and Maintenance Plan (described further in this document). Similar hazard assessment and planning considerations may be necessary for the transfer of operations or workspace to another organization.

This document contains the environmental, safety, and health (ES&H) elements of shutdown and transfer plans and recommendations for programs planning to

- Shut down major operations or a facility.
- Deactivate parts of a facility and its associated operations.
- Transfer responsibility for a facility or workspace to another organization.

These elements are outlined according to individual ES&H disciplines and are intended to be general in nature. Where specific recommendations are necessary, consult the responsible ES&H Team.

Deactivation, decontamination, and decommissioning operations (includes activities and experiments), where required, shall be accomplished in accordance with Document 12.8, "Decontamination and Disposition of Process Contaminated Buildings and Associated Equipment" in the *ES&H Manual*. "Process contamination" is contamination caused by programmatic operations.

This document, applied using a graded approach, should address the temporary or extended shutdown of facilities or operations, the transfer of responsibilities for operations and work spaces to another organization and/or the transfer of ES&H roles and responsibilities from one ES&H Team to another. At the lowest end of the graded approach would be routine transfer of an office trailer, warehouse, or office building with no hazardous operations or materials to another directorate. In such cases, a written Shutdown, Surveillance, and Maintenance Plan would not be required because the Facility Condition Disclosure form (from the Policy and Procedure for the Disposition of Space) would indicate that the trailer or building was not contaminated. A plan also would not be required if the same office trailer or office building were to be shut down for immediate demolition because existing Plant Engineering procedures and the *ES&H Manual* cover the operations involved. However, a plan would be

required if an office trailer or office building were to be transitioned for decontamination and decommissioning (i.e., mothballed) and for all other laboratory, shop, and contaminated office buildings. The detail and extent of the plan would depend on the particular facility and associated operations.

2.0 Shutdown and Transfer Hazards

Facilities and operations in a shutdown or transferred state often have a change in mission requirements, different system and equipment configurations, different staffing and management levels and different procedural requirements. The control methods for operating facilities and operations often do not apply directly to shutdown facilities and operations and if left unchanged could result in increasing the consequence or likelihood of unwanted events involving hazards in the facility.

3.0 Shutdown and Transfer Controls

The purposes of surveillance are to ensure the protection of employees and the public, demonstrate compliance with ES&H requirements, identify problems requiring corrective action, and determine the facility's current environmental, radiological and physical condition. More specifically, surveillance includes operations to be performed to

- Verify the operability of critical equipment.
- Monitor radiological and other health and safety conditions.
- Check safety-related items.
- Provide for facility security controls.
- Assess facility structural integrity.

Maintenance includes any daily operation required to sustain property in a condition suitable for it to be used for its designated purpose; maintenance includes preventive, predictive, and corrective maintenance.

All documentation pertinent to facility closure, shutdown, modifications, continuing operations, and maintenance—including a copy of the Shutdown, Surveillance, and Maintenance Plan—shall be sent to the Plant Engineering Documentation Group and the ES&H Team for concurrence. This information may be required later for formal reporting to the Department of Energy (DOE).

3.1 Shutdown and Surveillance Plan Format

When a facility is shut down, either temporarily or for an extended time, a Shutdown, Surveillance, and Maintenance Plan shall be prepared and shall include

- A description of the facility (or parts of the facility) or operation involved.
- The name of the Responsible Individual who will develop and implement the plan.
- A brief description of the potential hazards and their associated controls (including hazards from past work such as contamination) that may be present during and after shutdown.
- Specific procedures (see Document 3.4, "Preparation of Work Procedures" in the *ES&H Manual*) for
 - Safely shutting down the operation.
 - Meeting regulatory requirements regarding compliance with the National Environmental Policy Act (NEPA) and existing permit conditions; or closing permitted operations, managing wastes, and closing waste management areas (e.g., waste accumulation areas [WAAs]) and retention tank systems.
 - Performing ES&H surveillance.
 - Performing maintenance and inspection.

Refer to DOE G 430.1–2 for additional guidance.

A simpler plan (shown in Appendix A) may be used when

- A shutdown or the transfer of responsibility involves relatively small-scale operations.
- An individual laboratory, shop, or operation is shut down.
- The Responsible Individual transfers to another job.
- Responsibility for a workspace is transferred to another individual or organization.

3.2 Temporary Shutdown

When it is necessary to temporarily shut down an experiment or facility (for less than 24 months, or 12 months for nuclear Category 2 facilities), the Facility Manager or FPOC (if delegated) shall take the following steps, as appropriate, to ensure that the inactive facility remains safe and meets regulatory requirements. As a minimum, an Integration Work Sheet shall be prepared to review and authorize these actions.

The actions listed below each of the following headings shall be coordinated with the area ES&H Team to make sure that the operation or facility is safe.

3.2.1 Fire Protection

- Remove the power source from all nonessential equipment. Lock out and tag the equipment in accordance with the procedures in Document 12.6, "LLNL Lockout/Tagout Program" in the *ES&H Manual*.
- Remove all trash. Ensure that the area or building is free of rags, debris, and packing material.
- Ensure that means of egress are clear and unobstructed.
- Remove all unnecessary flammable and combustible liquids and gases.
- Review the fire protection needs for the building (fire sprinkler and alarm) with the fire protection engineer to determine the appropriate and adequate fire protection system, or portions thereof, to remain in service.
- Inspect all required fire protection systems and maintain them in accordance with current schedules.

3.2.2 Health Physics

- Remove sealed radioactive sources and as much of other radioactive materials as practical from the area or building. Provide a list of all remaining known and suspected radioactive materials.
- Consolidate and store radioactive liquids that must be retained for programmatic reasons in specifically designated HEPA-filtered glove boxes or hoods equipped with corrosion-resistant secondary containment. The ES&H Team health physicist will determine whether a hood or glove box is needed.
- Secure all glove boxes and fume hoods to the maximum extent possible to ensure known hazards are minimized.
- Post current dose rates, nuclides, and contamination estimates (where known) on all glove boxes, hoods, and HEPA filters.
- Maintain the required alarms and negative ventilation on all glove boxes and hoods containing radioactive or hazardous chemical products or contamination. Specify the steps required for ensuring that the power for the alarms and ventilation systems remain on.
- Remove and properly dispose of all radioactive waste from the area or building.

- Ensure
 - All radiation-producing equipment is de-energized. Lock out and tag the equipment in accordance with the procedures in Document 12.6.
 - Physical and /or administrative controls are in place to preclude the equipment from being re-energized without the appropriate review and approval.
 - Signs are posted properly in radiation and surface contamination areas.
- Maintain a radiological surveillance program for contamination control, as described in the ES&H Team's action plan, whether work is being conducted or not.

3.2.3 Industrial Hygiene

- Remove all
 - Chemicals with shelf-life limitations (e.g., ethers) or according to the frequency required by a permit.
 - Respirator supplies.
 - Food and perishable personal items (e.g., items in vending machines).
 - Compressed gas cylinders (except those used to support facility safety and support systems), then purge and cap the gas lines.
 - Excess chemicals from the area to be temporarily shut down. To reduce the amount of material to be disposed of as waste, transfer the chemicals and materials to other facilities, operations, or Chemical Exchange Warehouse (CHEW); or return unused material to the manufacturer.
- Ensure all chemicals are properly stored. Put all liquids in secondary containment.
- Update the ChemTrack inventory with all chemical storage locations and owner changes. Send bar codes from empty containers to the ChemTrack Operations Group to remove these items from the inventory.
- If hazardous materials are present, determine if eyewashes and safety showers are required and check them monthly to ensure they are accessible and functional. Tag and label eyewashes that have been removed from service.
- Check the building periodically and remove any rodents or birds.
- Check the condition of any asbestos-containing building materials to ensure they are properly contained.
 - Make sure all items necessary to meet RCRA requirements (e.g. emergency equipment, signs) are closed properly.

3.2.4 Industrial Safety

- Lock out and tag inactive cranes.
- Ensure equipment is adequately secured for potential seismic events.
- Secure the chains on hand-operated hoists (i.e., chain falls) so that they cannot be operated and tagged in the same manner as power-operated equipment.
- Ensure that required safety systems are operating.
- Discharge all energy sources (e.g., capacitors or pressurized systems). Lock out and tag these sources in accordance with the procedures in Document 12.6.
- Verify proper housekeeping.
- Test emergency systems and generators, as necessary. Maintain adequate lighting levels.
- Consult Plant Engineering regarding the development of routine maintenance procedures for the affected area(s).

3.2.5 Environmental Protection

- Pump out all liquids remaining in any affected retention tank system. Formal closure of the tank system may be initiated if it is no longer needed. Clean the system if it is not formally closed.
- Package all wastes in work areas and transfer them to the WAA within the regulatory time limits.
- Arrange with Hazardous Waste Management to have all wastes in WAAs picked up. Formal closure of WAAs may be initiated if the WAA is no longer needed.
- Determine if
 - Equipment in the area shut down has been issued an air permit, or RCRA permit and if the permit must be canceled or unit closed.
 - Categorical wastewater processes should be removed from the sanitary sewer permit. Inform the Environmental Protection Department if processes should be removed so it can revise the annual sanitary sewer permit application. Assistance can be provided by the ES&H Team.
 - Medical waste treatment equipment or generation points should be removed from the LLNL medical waste permit.
 - Waste treatment permits, recycling permits, or treatability studies should be closed.

- Evidence of spills of radioactive or hazardous materials or wastes should be reported to outside agencies or DOE if it may require cleanup or remediation.
- Equipment with PCBs should be removed from the building for storage or disposal.
- Contact the environmental analyst to determine if any building drain connections require protection or modification.
- Remove equipment containing PCB oil that has reached the end of its useful life. Retrofill any equipment remaining with non-PCB oil in accordance with regulatory requirements. Place other equipment into storage and conduct inspections in accordance with the regulatory time limits.
- Identify equipment or devices that should be monitored or periodically inspected during shutdown.
- Conduct Storm Water Pollution Prevention Plan surveys and National Emission Standards for Hazardous Air Pollutants (NESHAPs) monitoring and radionuclides inventory reporting as required.
- Inspect and maintain in serviceable condition all retention tanks containing (or that could potentially contain) waste that the Environmental Protection Department has not officially closed.
- Conduct weekly inspections of WAAs that the Environmental Protection Department has not officially closed.
- Inspect any equipment covered by an air permit in accordance with the conditions of that permit. Maintain logs as required.
- Inspect PCB-containing equipment in accordance with regulatory time limits.
- Conduct any RCRA inspections as required and maintain logs
- Check that all permitted requirements (such as final RCRA closures) have been implemented.

3.2.6 Responsible Individuals (program and facility)

Responsible Individuals shall as appropriate

- Identify all Program property and determine required maintenance schedules.
- Revise or cancel safety plans and /or procedures (FSPs, OSP, Work Permits, Operating Procedures) that no longer are applicable.
- Ensure the Contamination File, initiated in accordance with Document 12.8, is up-to-date.

3.3 Extended Shutdown (Mothballing)

Mothballing is the extended shutdown of a facility for future use or other disposition. The intent of mothballing is to maintain the facility at a level of acceptable residual risk while minimizing costs and accomplishing LLNL's mission.

The Facility Manager or FPOC (if delegated) shall take the following steps, as appropriate, to develop a Shutdown, Surveillance, and Maintenance Plan for extended shutdown (more than 24 months, or 12 months for nuclear Category 2 facilities). Some of these requirements may overlap among the safety disciplines; however, different perspectives on similar issues provide for a more comprehensive plan. As a minimum, an IWS shall be prepared to review these actions.

Each of the following perform the actions listed below.

3.3.1 Fire Protection

Perform the steps in Section 3.2.1, Fire Protection.

3.3.2 Health Physics

In addition to performing the steps in Section 3.2.2, Health Physics do the following:

- Check that equipment containing radioactive sources is properly labeled to ensure that the necessary precautions are taken when the equipment is disposed of or relocated.
- Determine if active containment (e.g., ventilation, chemistry fume hoods, glove boxes, and high-efficiency particulate air [HEPA] filters) is necessary for radioactive materials and/or contamination. If required, outline steps to ensure that the power for these systems remains on.
- Conduct radiation and contamination surveys and ensure they are fully documented.

Develop and conduct a routine surveillance program to maintain proper control of any radioactive material or radiation-producing equipment. This program should include the following, as appropriate:

- A swipe sampling program for alpha, beta, and tritium testing.
- Radiation surveys.
- Retention tank monitoring.

- Radiation-detection equipment, such as hand and foot counters and radiation survey meters.
- Verification that radiation-producing equipment is secured.

3.3.3 Industrial Hygiene

In addition to performing the steps in Section 3.2.3, Industrial Hygiene, do the following:

- Encapsulate all damaged asbestos-containing materials.
- Determine if the ventilation system for material control should be left on or turned off.
- Determine if HEPA filters should be bypassed, secured, or left in line.
- Swipe areas to determine the status of cleanup.
- Document clean-up and decontamination operations are completed before and during the inactive period.
- Check the operating ventilation systems and HEPA filters annually.

3.3.4 Industrial Safety

In addition to performing the steps in Section 3.2.4, Industrial Safety, do the following:

- Schedule regular industrial safety inspections with the ES&H Team, as appropriate.
- Ensure that the Hazards Control Department receives the required inspection reports from other support organizations for the inactive facility. Report any discrepancies to the program.
- Review the ES&H Team's action plan and incorporate requirements in the Shutdown, Surveillance, and Maintenance Plan, as appropriate.
- Ensure adequate lighting for surveillance and maintenance work

3.3.5 Environmental Protection

In addition to performing the steps in Section 3.2.5, Environmental Protection, do the following:

- Conduct inspections of secondary containment basins and manage accumulated rainwater according to LLNL protocol.
- Conduct daily inspections of all hazardous retention tank systems and weekly inspections of nonhazardous systems that have not been closed.

- Empty and clean all product tanks (e.g., diesel fuel tanks).
- Notify the facility manager and ES&H Team of any questionable conditions observed during the shutdown period. Perform the actions listed below each of the following headings for surveillance and maintenance.

3.3.6 Responsible Individuals (program and facility)

- Remove all programmatic and personal property.
- Ensure the Contamination File, initiated in accordance with Document 12.8, is up-to-date.

3.4 Transfer of Operations or Facilities

Transfer of an operation or workspace, including transportainers, between organizations should be managed as separate processes (i.e., terminating one operation and beginning another) within an appropriate transition period. Ideally, the transfer process is a joint effort between the individual parties to plan and document the details using a graded approach. The outgoing and incoming organizations have a shared responsibility to consider the ES&H implications of the transfer. A transfer plan that evaluates the status of the facility and equipment, inventory of useful materials and wastes, as well as operating and ES&H procedures and documentation shall be prepared. The transfer process must also determine which organization will take responsibility for correcting any deficiencies that exist.

Outgoing organization planning considerations. The outgoing organization shall review the preshutdown planning guidelines in this document that are applicable to terminating an operation, and take the actions necessary for the materials, equipment, and facility features that are not to be transferred. Information in the ChemTrack database about material storage location and ownership shall be modified as needed.

Transition considerations. The outgoing and incoming organizations shall review the status of the current operation to determine the responsibility for potential concerns such as identifying unknown materials and wastes; transferring permits; and assuming the legacy of equipment, facility, and environmental deficiencies.

Incoming organization planning considerations. Document 2.2, "Managing ES&H for LLNL Work" in the *ES&H Manual* covers the requirements for work planning that shall be applied at the onset of the new operation. The incoming organization shall evaluate any equipment and inventory to be received; review and update procedures, permits, and ES&H documentation for the operation or facility; and determine workers' training and qualification status.

A prestart review, readiness assessment, or operational readiness review shall be conducted as a final check before a new operation begins.

3.5 Restart of the Facility or Operation

Before restarting a shutdown facility or operation, the responsible associate director (AD) shall ensure that the facility or operations programmatic personnel develop, agree upon, and implement a start-up plan. See Document 2.2 for information about developing start-up plans (Prestart Reviews) for nonnuclear facilities. LLNL nuclear facilities that have been shut down must follow the restart requirements in Document 51.4, "Startup and Restart of Nuclear Facilities" in the *ES&H Manual*.

4.0 Responsibilities

All workers and organizations shall refer to Document 2.1, "Laboratory and ES&H Policies, General Worker Responsibilities, and Integrated Safety Management" in the *ES&H Manual* for a list of general responsibilities. This section describes specific responsibilities of LLNL organizations and workers who have key safety roles.

Each AD is assigned responsibility for specific facilities and for making sure that operations within those facilities are in compliance with LLNL's Work Smart Standards and the facility-specific authorization basis (for nuclear facilities). Thus, before a facility or any of its parts can be shut down, or before operations can be terminated, the cognizant facility AD shall ensure that programmatic personnel develop, agree upon, and implement a shutdown plan.

Plan Review and Approval. As a minimum, the plan shall be reviewed and signed by

- The author of the plan. This individual usually is responsible for carrying out the plan.
- The leader of the ES&H Team that supports the facility.
- The program leader or deputy associate director (or equivalent) authorized to commit funds and resources for executing the plan.
- The Plant Engineering Maintenance and Operations Department head.

5.0 Work Standards

The requirements in this document are governed by the Laboratory's ES&H policies and are presented in its work standards. These are as follows:

- Fire Protection
 - NFPA1, "Fire Prevention Code"
 - NFPA25, "Inspection, Testing, and Maintenance of Water-based Fire Prevention Systems"
 - NFPA72, "National Fire Alarm Code"
- Health Physics
 - 10CFR835, "Occupational Radiation Protection"
- Industrial Hygiene
 - 29CFR1910.120, "Hazardous Waste Operations and Emergency Response"
 - 29CFR1910.1200, "Hazard Communication"
 - 29CFR763 "Asbestos"
- Industrial Safety
 - 29CFR1910, "Occupational Safety and Health Standards for General Industry"
 - 29CFR1926, "Safety and Health Regulations for Construction"

DOE Order 440.1A, "Worker Protection Management for DOE Federal and Contractor Employees," Attachment 2, "Contractor Requirement Document," Sections 1–11, 13–18 (delete item 18.a), 19 (delete item 19.d.3) and 22.

DOE O 430.1A, "Life-Cycle Asset Management."

6.0 Resources for More Information

6.1 Contacts

Direct questions or concerns regarding this document to

- Field Support
 - ES&H Teams (includes environmental analysts)
- Institutional Issues
 - LLNL Institutional Facility Manager

6.2 Applicable Lessons Learned

The Lessons Learned Program is available on the Internet at the following URL address:

http://www-r.llnl.gov/es_and_h/lessons/lessons.shtml

6.3 Other Sources

DOE G 430.1-2, "Implementation Guide for Surveillance and Maintenance during Facility Transition and Disposition."

DOE G 430.1-3, "Deactivation Implementation Guide."

Appendix A

Sample LLNL Operation-Level Closeout Procedure

The procedure in this appendix may be used when a relatively small-scale operation is terminated, the Responsible Individual moves to another job, or responsibility for the building space is transferred to another individual or organization. The objectives of this procedure are to

1. Ensure that hazardous wastes and materials are properly disposed of or reused.
2. Minimize the generation of wastes.
3. Identify the individual who will assume responsibility for the remaining materials, equipment, or facility.
4. Update the ChemTrack database.

Complete the closeout procedure below. Use additional sheets if necessary. Give the completed form to the new Responsible Individual. Transfer any open DefTrack items to the new owner, but notify the facility manager of your plans.

Today's date _____

Name of person responsible for closeout _____

Facility directorate _____ Phone number _____

Close-out area: Building _____ Room _____ RMMA:¹ Yes ☐ No ☐

Lab/Shop/Operation Name _____

Estimated date of closeout _____

If known, provide the name of the new Responsible Individual _____

Closeout Procedure

1. On Form A,
 - List any hazardous, mixed, or radioactive materials or contaminated equipment involved in the operations of this area.
 - List any plans for reuse, storage, or decontamination.

¹ Radioactive Materials Management Area

2. Contact the ES&H Team for assistance in evaluating the hazards to be controlled or eliminated before closeout.
3. Arrange for the safe transfer or storage, or both, of items identified in step 1 that will be reused or excessed. Update the ChemTrack inventory with all chemical storage location and owner changes. Send bar codes from empty containers to the ChemTrack Operations Group to remove these items from the inventory.
4. Make arrangements for items identified as waste in step 1 to be disposed of within the regulatory time limits and in accordance with LLNL waste labeling, packaging, and transportation procedures.
5. On Form B,
 - List any deficiencies, permits, exemptions, variances, or waste-handling areas (e.g., WAAs, waste retention tank systems, recycling, and treatment units) that affect the area and require formal closure.
 - List any categorical wastewater discharge processes in place that are monitored by the Environmental Protection Department. Contact the ES&H Team environmental analyst for assistance, if necessary.
6. Make arrangements for a final review and walk-through with the ES&H Team and the facility manager so they can verify that the closeout has been properly completed.

Closeout approval signatures:

Responsible Individual for closeout
(Certifies closeout was completed)

Date

New Responsible Individual
(Assumes responsibility for the area)

Date

Facility Manager

Date

ES&H Team Leader

Date

By signing this form, the facility manager verifies that the walk-through and closeout have been completed. The facility manager is responsible for retaining the original copy of the completed forms and for providing copies to the ES&H Team leader, facility directorate assurance managers, the person responsible for the closeout, and the new Responsible Individual.

Form A

Name _____ Phone No. _____ Date _____

Area to be vacated _____

List materials, waste, or equipment	Describe plans for disposal, storage, decontamination, and/or reuse

Form B

Name _____ **Phone No.** _____ **Date** _____

Area to be vacated_____

List open deficiencies, permits, exemptions, variances, categorical discharge processes, or waste-handling facilities requiring formal closure.

This image shows a full page of white paper with horizontal blue ruling lines. The lines are evenly spaced and run across the width of the page, providing a template for handwriting practice or general writing. There are no margins, text, or other markings on the page.